Answer on Question #48946 – Chemistry – Inorganic Chemistry

Question:

Calculate the magnetic moment in 1113 units for a paramagnetic substance having three unpaired electrons.

Answer:

The effective magnetic moment caused by spin values for paramagnetic compound is defined:

$\mu = g \times [S(S+1)]^{1/2}$, where S – a total spin for the unit, g – the constant being of 2.0023

The total spin equals:

$S = n \times 1/2 = 3 \times 1/2 = 3/2$, where n – the number of unpaired electrons.

Thus, for 1 unit, $\mu = 2.0023 \times [3/2(3/2+1)]^{1/2} = 3.87 \; \mu_B$, where $\mu_B = 9.274 \times 10^{-24}$ J T^{-1}

The total magnetic moment can be found from the equation:

$M = m \times \mu$, where m – the number of units.

So, $M = 1113 \times 3.87 \; \mu_B = 4307.31 \; \mu_B = 39946 \times 10^{-24}$ J T^{-1} $\approx 4 \times 10^{-20}$ J T^{-1}